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THE IMPACT OF MULTI-LEVEL MATERIALS ON TEACHING BEHAVIOR AND LEARNING OUTCOMES.

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AN EXPERIMENTAL MULTILEVEL INSTRUCTIONAL PROCEDURE FOR TEACHING HISTORY AS AN INQUIRY PROCESS WAS TESTED ON EIGHT SEVENTH-GRADE CLASSES TO INVESTIGATE CHANGES IN TEACHING BEHAVIOR AND PUPIL LEARNING OUTCOMES, AS COMPARED WITH CONVENTIONAL TEXTBOOK METHODS. WHILE NO CLEAR EVIDENCE WAS OBTAINED THAT PUPILS PREFERRED TO WORK WITH THE MULTILEVEL MATERIALS, TESTS INDICATED THAT STUDY SKILLS AND CRITICAL THINKING WERE IMPROVED BY USE OF THE EXPERIMENTAL INQUIRY METHOD. USE OF MULTILEVEL MATERIALS APPEARED TO HAVE LITTLE EFFECT ON TEACHING BEHAVIOR. (JK)

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THE IMPACT OF MULTI-LEVEL MATERIALS ON TEACHING BEHAVIOR AND LEARNING OUTCOMES

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ABSTRACT

This study investigates changes in teaching behavior and learning outcomes associated with the introduction of organized multi-level instructional material.

Specific Objectives:

1. Do teachers working with multi-level materials shift to patterns of teaching behavior which are different from those used when working with conventional materials?

2. Do students working with multi-level material develop more skills in the interpretation and use of data than do other students?

3. Do students report more satisfaction with multi-level material than with a single text?

Procedure:

Three volumes of experimental materials, each designed for a separate reading level and embodying an inquiry approach to history, were used in eight seventh grade Kentucky history classes. Teachers participated in a two week workshop in preparation for teaching with the special materials.

Observations were made of the teachers using the experimental materials and again after the teachers had moved on to the next unit in social studies employing conventional materials. The observer completed a check list indicating the presence of student behaviors logically related to an inquiry approach to learning history.

Tests of cognitive preference, and of critical thinking were developed and administered to the experimental classes and control classes drawn from the same school buildings.

A questionnaire designed to gauge student reaction to history taught with the experimental materials and methods was administered to students in the two grups.

Results

The observation procedures employed failed to reveal substantial shifts in teaching behavior associated with the use of the special materials.

Holding intelligence constant by covariance procedures, no significant differences was found between the experimental and control groups on the test for cognitive preference. Significant differences were obtained, however, on the test measuring study skills and critical thinking.

No clear evidence was obtained that pupils preferred to work with the multi-level materials.

The Impact of Multi-Level Materials on Teaching Behavior and Learning Outcomes

PURPOSE

Teachers, for a variety of reasons, tend to be bound to their instructional materials, in most cases, a single text for the course. While supplementary materials are often recommended for use in individualizing instruction, they have rarely been assembled on a systematic basis nor has the impact of such materials on learning been carefully evaluated. The primary purpose of this study is to investigate changes in teaching behavior and learning outcomes which occur with the introduction of organized non-text instructional materials.

BACKGROUND

Mallinson and Buck (1) note that the textbook has probably been criticized more than any other teaching aid and cite recommendations that the text be supplemented by a variety of materials from other books, periodicals, and reference works. They continue: "A search of the literature reveals but a single research study...that deals with the hypothesis implicit in the statement quoted above."

If experimental work is lacking, there is certainly no dearth, particularly in history, of a rationale and philosophy which suggests the need for non-text materials. Bloom's well-known Taxonomy of Educational Objectives (2) defines the levels and kinds of intellectual process which transcend specific content. Ralph Tyler (3) points out that in history, students typically deal with the products of historical research, rarely with the process. Dahmus (4) comments that: "Serious students who have studied this problem...have been unanimous in recommending greater use of primary sources." Swint (5) suggests that such sources should be broadened to include the traditions, customs, folkways, morals

and value systems developed in a society at any given time along with the machinery developed to safeguard them. Spiegel (6) says that the primary value in studying such facts is the achievement of a synthesis, a generalization, an hypothesis, a theory, or a law which will help us deal with a problem or predict future occurrences and in a later article (7) attempts to tentatively identify some historical "laws."

These threads of thought combine to suggest, as does Shannon (8), that the relationship between critical thinking and history can be realized more fully as we are able to enlarge sources of information well beyond the textbook. A much broader range of materials may appropriately be used, and the goals of instruction might well extend beyond specific content to include the development of intellectual habits and the search for major generalizations.

With such considerations in mind, a collection of readings for seventh grade Kentucky history was assembled over a period of several years. Selections were made with a view toward the dramatic qualities of the material, the opportunities offered for historical analysis, and the appropriateness for a particular level of reading ability.

The materials are assembled in three paper-back volumes, each designed for a different reading level. Articles in each volume are arranged so that students, while reading different selections, are studying the same historical period. In addition, the materials sometimes present the students with conflicting testimony which may serve as starting points for inquiry. For example, some students read the diary of a Confederate infantryman, describing the Southern attack at the battle of Shiloh, others read the claim of a Federal officer that his regiment turned the tide of battle for the North, while still another group of students read General Grant's rebuttal of this claim. Teachers are

thus provided opportunities to discuss ways of evaluating sources of information and procedures for resolving problems posed by conflicting accounts.

While the experimental materials offer opportunities to develop generalizable skills in inquiry, little is known about the extent to which teachers and students make use of such opportunities. Is it likely that instruction will move toward the utilization of specific content to support, question or modify the larger generalizations being considered? Three specific questions may be asked:

1. Do teachers working with multi-level material shift to patterns of teaching behavior which are different from those used in working with conventional material?
2. Do students working with a variety of materials develop more skill in the interpretation and use of data than do other students?
3. Do students report more satisfaction with multi-level material than with a single text?

PROCEDURE

Ten junior high school teachers in Fayette county, Kentucky agreed to use the experimental materials during the fall of 1966. The teachers were brought together for a two week summer workshop to make preparations for using the material. During this time, a rationale for teaching history as an inquiry process was worked out. The rationale relied heavily on the well known work of Edwin Fenton (9) and Herbert Thelen (10).

Instructional units were developed by the teachers using a format composed of five elements:

1. Confrontation: A situation complex enough to allow a variety of interpretations and interesting enough to involve students. Example: Students examine authentic Indian artifacts and speculate about the nature of Indian Life.

2.	Inputs:	Additional material fed into the learning environment because of its relevancy to the problem at hand. Example: Reports of archeologists and fictionalized accounts of early Indian life.
3.	Cues and prompts:	Statements made by the teacher which keep the inquiry process moving. Example: "How much of what you are saying is supportable?"
4.	Issues:	Larger (more inclusive) controversies of which the problems under discussion are a specific example. Example: Is our present view of the Indian largely fact or fiction?
5.	Outputs:	Instructional objectives of the unit: broad generalizations and concepts, attitudes and values, and mental process. Example: To develop a feeling for prehistoric man in America, and to provide practice in formulating and examining inferences.

Using this format, instructional units were developed dealing with pre-history, the pioneer period, pre-civil war, the civil war, post-civil war, and modern Kentucky.

In the fall, eight of the ten teachers started using the multi-level materials guided by the lesson plans developed during the summer.

In order to determine the impact of the materials (and the training) on teaching behavior, 31 classroom observations were made over a period of two months. All observations were pre-scheduled and were recorded on audio tape. In addition, the observer completed a form indicating the presence or absence of twelve student activities which seem logically related to an inquiry approach to teaching history. Comparative data were obtained in January by observing the same teachers as they continued into the next unit of social studies using a single text.

To determine whether students acquired more skills associated with inquiry behavior than students working with more traditional materials, two tests were developed and administered to the experimental classes and to control classes drawn from the same school buildings.

The Cognitive Preference Test, following certain notions presented by Heath (11), contained twenty items permitting the student to indicate his preference for performing analytical or inferential operations on data as opposed to remembering or restating some part of it. The test-retest reliability computed on scores of 56 seventh grade students with one week intervening is .63. The Kuder Richardson-20 reliability coefficient with an n of 135 is .54.

The test of Study Skills and Critical Thinking modeled after the items written by Mores and McCune (12), contained twenty-five items designed to measure the students' ability to recognize fact and opinion, primary and secondary sources, biased sources of information, and data supporting a particular generalization. This test yielded a test-retest reliability coefficient of .81 and a Kuder Richardson-20 reliability coefficient of .69 with the same subjects used in establishing the reliability estimates for the test above.

Finally, students in both the experimental and control groups completed a brief six item questionnaire asking them to check among nine junior high school courses those they liked most and those they liked least together with comments regarding class activity and difficulty of material.

RESULTS

Table 1 summarizes the results of the classroom observations. Six of the original 31 observations are not included in this tabulation as the classroom period was occupied with dramatic skits, pagents or debates.

The table entries present the percent of observations during which the observer noted students engaged in designated activities associated with inquiry behavior.

Table 1

PERCENT OF OBSERVATIONS DURING WHICH DESIGNATED ACTIVITY WAS NOTED

Activity	With Experimental Materials*	With Single Text**
Evaluating sources of information	12%	0%
Identifying relevant information	12	14
Distinguishing facts from opinions	36	14
Distinguishing primary sources	4	0
Drawing inferences	68	70
Checking information	4	0
Comparing for consistency	4	0
Expressing their own views	92	84
Developing generalizations	56	56
Conducting discussions	36	28
Identifying issues	16	14
Following curiosity	36	42

* Based on 25 observations
** Based on 7 observations

While these data may be relatively impercise, they suggest considerably less change in teaching behavior than had been anticipated. The teachers tended to make frequent use of pupil participation and discussions in which students develop generalizations and make use of inferential processes. This seems to be true whether the teachers were using the experimental multi-level materials or a common text. Distinguishing fact from opinion was emphasized more while teaching history with the experimental materials than when teaching the next unit of social studies with a single text.

Using analysis of covariance, the means for the Cognitive Preference Test and Study Skills and Critical Thinking were adjusted for the effects of intelligence, and the difference between the adjusted means for the experimental and control groups were evaluated for statistical significance. These means and the summary of the covariance analysis (F ratios) are presented below.

Table 2

ADJUSTED MEANS AND F RATIOS

Test	Experimental Group (n-432)	Control Group (n-191)	F Ratio
Cognitive Preference Test	10.03	9.71	2.0639
Study Skills and Critical Thinking	12.17	11.07	15.6440**

** $p \leq .01$

The data in the table above indicate that no significant difference between the experimental and control groups is revealed by the means of the Cognitive Preference Test. The mean scores for the two groups on the test of Study Skills and Critical Thinking, however, are significantly different. These findings suggest that the experimental materials and methods are associated with greater pupil gains in inquiry skills, but not necessarily with a greater preference for inquiry activities. This interpretation is offered with caution, however, as there is considerable overlap between the two variables. The correlation between scores for cognitive preference and scores for study skills and critical thinking is .487 for the 623 subjects in this study. Both of these measures correlate with intelligence above .50.

Examination of responses on the questionnaire designed to indicate degree of pupil satisfaction with the experimental materials and procedures failed to reveal clear evidence that history, taught in the described manner, elicited more favorable comment than when taught in more conventional ways. Written comments of pupils directed specifically at the materials ranged from praise to criticism:

> "The subjects are more interesting than the usual grind of history books. It goes into detail of human feelings instead of bombarding us with dates and cold facts."

> "The little brown book is a dreadful little book. I hate to read those stories. I would rather read (the textbook)."

SUMMARY AND DISCUSSION

Instructional materials were assembled embodying provisions for individual differences and reflecting a rationale for inquiry-oriented teaching. Selected teachers worked for two weeks to further evolve ways of using these materials in their instruction.

Subsequent observations of these teachers guided by a checklist of student behaviors related to inquiry learning seemed to suggest little shift in instructional format as the teachers moved from special material back to a common text.

Measures of student gains in inquiry skills did seem to be associated with the special materials and conditions, but there was no evidence that pupils preferred inquiry operations over more pedestrain learning activities, whether this preference was measured by a test or by a questionnaire.

The findings of this study seem to stand in sharp contrast to written reactions of the teachers involved in the project and to subjective impressions gained from listening to the tapes of the experimental classes. There would seem to be a good likelihood that the observational procedure employed was not sensitive enough to provide a precise description of teaching behavior.

The tests administered to the students were brief, possessed only moderate reliability, and exhibited overlap with each other and with intelligence. Revisions and extensions of these instruments are now underway. Hopefully, the development of these research instruments will keep pace with the rapid and imaginative social studies curriculum developments of this decade.

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